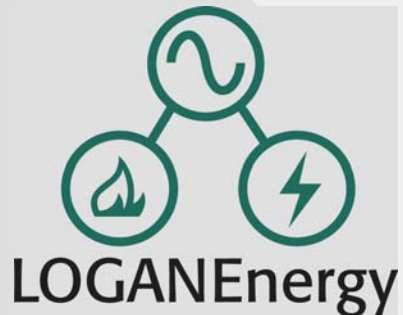


**W9132T-05-C-0031**



U.S. Army Engineer Research and Development Center,  
Communications Facility, Fort Hood, Texas  
Midpoint Project Report

Proton Exchange Membrane (PEM) Fuel Cell Demonstration  
Of Domestically Produced PEM Fuel Cells in Military Facilities

US Army Corps of Engineers  
Engineer Research and Development Center  
Construction Engineering Research Laboratory  
Broad Agency Announcement **CERL-BAA-FY04**

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1080 Holcomb Bridge Rd  
Suite 100-175  
Roswell, GA 30076  
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**U.S. Army, Fort Hood, TX**

**May 30, 2007**

**California:**

6370 Split Rock Ave  
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## Executive Summary

Under terms of its FY'04 DOD PEM Demonstration Contract with ERDC/CERL, LOGANEnergy has installed and operates two Plug Power GenCore 5kWe standby fuel cell power plants at the Fort Hood airfield communications center, Remote Service Center (RSC4). For the one-year demonstration, the units are attached directly to the facility's DC bus to enhance critical power availability. However, the system is also configured to independently test and evaluate the reliability of the GenCore without diminishing its utility. Fort Hood will not bear any cost burden in the project.

The FAA POC for this project is:

Mr. Robert L Kennedy  
Program Manager, Fort Hood DPW  
Bldg 4219, 77<sup>th</sup> & Warehouse Ave.  
Fort Hood, TX 96544-5028  
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## Table of Contents

EXECUTIVE SUMMARY .....	2
1.0 DESCRIPTIVE TITLE .....	4
2.0 NAME, ADDRESS AND RELATED COMPANY INFORMATION .....	4
3.0 PRODUCTION CAPABILITY OF THE MANUFACTURER .....	4
4.0 PRINCIPAL INVESTIGATOR(S).....	5
5.0 AUTHORIZED NEGOTIATOR(S).....	5
6.0 PAST RELEVANT PERFORMANCE INFORMATION .....	5
7.0 HOST FACILITY INFORMATION.....	6
8.0 FUEL CELL INSTALLATION.....	6
9.0 ELECTRICAL SYSTEM .....	8
10.0 THERMAL RECOVERY SYSTEM.....	9
11.0 DATA ACQUISITION SYSTEM .....	9
12.0 FUEL SUPPLY SYSTEM .....	10
13.0 INSTALLATION COSTS.....	10
14.0 ACCEPTANCE TEST.....	10
APPENDIX .....	11

## **Proposal – Proton Exchange Membrane (PEM) Fuel Cell Demonstration of Domestically Produced Residential PEM Fuel Cells in Military Facilities**

### **1.0 Descriptive Title**

LOGANEnergy Corp. Small Scale PEM 2004 Demonstration Project at Fort Hood, TX airfield communications facility.

### **2.0 Name, Address and Related Company Information**

LOGANEnergy Corporation

1080 Holcomb Bridge Road  
BLDG 100- 175  
Roswell, GA 30076  
770-650- 6388

DUNS 01-562-6211  
CAGE Code 09QC3  
TIN 58-2292769

LOGANEnergy Corporation is a private Fuel Cell Energy Services company founded in 1994. LOGAN specializes in planning, developing, and maintaining fuel cell projects. In addition, the company works closely with manufacturers to implement their product commercialization strategies. Over the past decade, LOGAN has analyzed hundreds of fuel cell applications. The company has acquired technical skills and expertise by designing, installing and operating over 30 commercial and small-scale fuel cell projects totaling over 7 megawatts of power. These services have been provided to the Department of Defense, fuel cell manufacturers, utilities, and other commercial customers. Presently, LOGAN supports 30 PAFC and PEM fuel cell projects at 21 locations in 12 states, and has agreements to install 22 new projects in the US and the UK over the next 18 months.

### **3.0 Production Capability of the Manufacturer**

Plug Power manufactures a line of PEM fuel cell products at its production facility in Latham, NY. The facility produces three lines of PEM products including the 5kW GenSys5C natural gas unit, the GenSys5P LP Gas unit, and the GenCor 5kW standby power system. The current facility has the capability of manufacturing 10,000 units annually. Plug will support this project by providing remote monitoring, telephonic field support, overnight parts supply, and customer support. These services are intended to enhance the reliability and performance of the unit and achieve the highest possible customer satisfaction. Vincent Cassala is the Plug Power point of contact for this project. His phone number is (518) 782-7700, and his email address is Vincent\_cassala@plugpower.com.

#### 4.0 Principal Investigator(s)

Name	Chris Davis	Keith Spitznagel
Title	Chief Operating Officer	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770-650-6388 ext. 101	860-210-8050
Fax	770-650-7317	770-650-7317
Email	<a href="mailto:samlogan@loganenergy.com">samlogan@loganenergy.com</a>	<a href="mailto:kspitznagel@loganenergy.com">kspitznagel@loganenergy.com</a>

#### 5.0 Authorized Negotiator(s)

Name	Chris Davis	Keith Spitznagel
Title	Chief Operating Officer	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770-650-6388	860-210-8050
Fax	770-650-7317	770-650-7317
Email	<a href="mailto:samlogan@loganenergy.com">samlogan@loganenergy.com</a>	<a href="mailto:kspitznagel@loganenergy.com">kspitznagel@loganenergy.com</a>

#### 6.0 Past Relevant Performance Information

##### a) Contract: PC25 Fuel Cell Service and Maintenance Contract #X1237022

Merck & Company  
Ms. Stephanie Chapman  
Merck & Company  
Bldg 53 Northside  
Linden Ave. Gate  
Linden, NJ 07036  
732-594-1686

Four-year PC25 PM Services Maintenance Agreement.

In November 2002 Merck & Company issued a four-year contract to LOGAN to provide fuel cell service, maintenance and operational support for one PC25C fuel cell installed at their Rahway, NJ plant. During the contract period the power plant has operated at 94% availability.

##### b) Contract: A Partners LLC Commercial Fuel Cell Project Design, Installation and 5-year service and maintenance agreement on 600kW UTC PC25 power block. Contract # A Partners LLC, 12/31/01

Mr. Ron Allison  
A Partner LLC  
1171 Fulton Mall  
Fresno, CA 93721  
559-233-3262

- c) Contract: At Gulfport, MS U.S. Navy facility, executed a service contract to maintain a 200 kW PC25 phosphoric acid fuel cell power plant.

Reliant Energy  
PO Box 4300  
Houston, TX 77210-430  
713-207-6199

## 7.0 Host Facility Information

Fort Hood is the largest active duty armored post in the United States Armed Services, supporting two full armored divisions. Fort Hood rests in the 'hill and lake' country of Central Texas between Killeen and Copperas Cove and is approximately 60 miles north of the capital city of Austin, 50 miles south of Waco, 160 miles south of Dallas, and 150 miles north of San Antonio. Fort Hood covers a total of 339-square miles. In addition to the 1st Cavalry Division and 4th Infantry Division

(Mechanized), Fort Hood is also residence for: 13th Corps Support Command, Headquarters Command III Corps, 3rd Signal Brigade, 13th Finance Group, 3rd Personnel Group, 89th Military Police Brigade, 504th Military Intelligence Brigade, 3rd Air Support Operations Group, TRADOC Test and Experimentation Command (TEXCOM), 21st Cavalry Brigade (Air Combat), Medical Dept. Activity (MEDDAC), and Dental Activity (DENTAC).



Figure1. Airfield area at Fort Hood

## 8.0 Fuel Cell Installation

The fuel cells were installed near Building 7008 at Hood Army Airfield. This is a communications facility, Remote Service Center 4 (RSC4). The communications system has battery backup power that is estimated to last 4 hours or less but there is no backup generation on site. Figure 2 shows the RSC4 site prior to installation of the fuel cells.

Exact placement of the fuel cells was made after consideration of Force Protection, Fire



Figure2. Site - Prior to Construction

Department, and access issues. The units were located 15 feet away from the RSC4 building. After initial consideration of placing the units inside the existing fence on the asphalt, the final location outside the fence was selected to allow for easier access of fuel delivery. Supplemental fencing was added (after other construction was complete) to provide access security.

Each fuel cell (GenCore) unit and its associated hydrogen storage module (HSM) were placed on a pre-formed concrete pad as shown in Figure 3. A steel frame was constructed next to the building for mounting electrical enclosures.



Figure3. Fuel Cells in-place at Site

Figure 4 shows the completed fuel cell site. A small canopy was constructed over the electrical enclosures to provide shade from the hot summer direct sunlight. A fence was added along the east side with gate access on the south side.





Figure4. Units Installed – Construction Complete

## 9.0 Electrical System

Grid power to the RSC4 facility is supplied via underground distribution. Backup power to the critical loads is supplied by a small bank of batteries that will support the loads for a few hours. The batteries supply a - 48 volt DC bus.

The Plug Power GenCore 5kW PEM standby fuel cell power plants selected for this project provides -48 volt DC power to the communications equipment bus located inside the facility, as shown in Figure 5. With the fuel cells connected to the DC bus, the existing system functions just as it normally does without the fuel cells. However, as a grid outage continues, the existing backup batteries will begin to deplete; causing the bus voltage to lower which will trigger the fuel cells to start. With the fuel cells on-line, the -48 volts on the bus will be maintained, and the batteries charged, so long as the fuel cells continue to operate.



Figure5. RSC4 Interior

Connection of the fuel cells' output to the communications bus was accomplished by routing cables in a trench, through the enclosures, and then into the building as shown in Figure 6.





Figure6. Installation of Electrical Conductors

#### 10.0 Thermal Recovery System

Thermal recovery will not be a part of this project.

#### 11.0 Data Acquisition System

Per the requirement for CERL demonstrations, data will be collected to determine compliance with the required 90% availability. For a backup power application such as Fort Hood, this means the fuel cells must start for at least 90% of the events when called upon. Since it is unlikely that actual grid outages will be frequent enough to test the fuel cell response, relays were installed to automatically (and with no disruption to the DC bus) disconnect the fuel cell from the bus and trigger the fuel cell to start off-line from the site DC bus. Controls prevent testing if an actual grid outage is in progress. The automated testing is programmed for the fuel cell to start 3 times per day for 6 days per week. For the daily startups, the fuel cell will run 15, 10, and 10 minutes. One day per week the fuel cell will run for 60 minutes. Data is collected by dialing-in to the fuel cell via telephone lines and downloading the current data. Data parameters include number of starts, kilowatt hours, fuel pressure, and operating time. See monthly summary data in the Appendix.

The fuel cells are also capable of outputting several alarms. One alarm output indicates stop/shutdown conditions. A second alarm output indicates that the fuel cell has started and is operating. Fort Hood wanted this alarm particularly so that, when they receive an alarm for their system that the site is without power, they can immediately check for the alarm to see that the fuel cell is operating. A third alarm output indicates low fuel on-hand. At Fort Hood's request, these three alarms were connected into their communications alarm system which was available at the building. The alarms are observable at the Fort Hood Communication Center which is monitored 24/7.

## 12.0 Fuel Supply System

Each fuel cell unit is equipped with an accompanying HMS which houses six hydrogen cylinders connected in two banks. When one bank of three cylinders is depleted, the unit switches to the other bank of three cylinders. Hydrogen filled cylinders are furnished and replaced as needed by a local industrial gas supplier (AirGas.). LOGANEnergy monitors fuel pressure levels and calls AirGas for delivery as needed.

## 13.0 Installation Costs

### Fort Hood, TX Communications Facility PEM Project

#### Project Utility Rates

1) Water (per 1,000 gallons)	
2) Utility (per KWH)	
3) Hydrogen ( per bottle)	\$ 50.00

First Cost	Estimated	Actual	Variance
Plug Power 5 kW GenCore 2 ea.	\$ 30,000.00	\$ 29,830.00	\$ (170.00)
Shipping	\$ 3,500.00	\$ 600.00	\$ (2,900.00)
Installation electrical	\$ 2,480.00	\$ 4,235.00	\$ 1,755.00
Communications package	\$ 3,140.00	\$ 2,935.00	\$ (205.00)
Testing controll package	\$ 2,250.00	\$ 7,314.00	\$ 5,064.00
Site Prep, labor materials	\$ 450.00	\$ 545.00	\$ 95.00
Technical Supervision/Start-up	\$ 1,750.00	\$ 1,000.00	\$ (750.00)
Total	\$ 43,570.00	\$ 46,459.00	\$ 2,889.00
Assume Five Year Simple Payback	\$ 8,714.00	\$ 9,291.80	

Forecast Operating Expenses	Volume	\$/Hr	\$/ Yr
Hydrogen	-	-	\$ 5,174.00
Service			\$ 2,000.00
Total Annual Operating Cost			\$ 7,174.00

#### Economic Summary

Forecast Annual kWh	301
Annual Cost of Operating Power Plant	\$ 23.82 kWh
Project Net Operating Cost	\$ 23.82 kWh

## 14.0 Acceptance Test

A LOGAN technician reported the fuel cell units checked out and were operating properly on June 6, 2006. However, phone lines were not available to allow full normal operation. After phone lines were installed, data collection in fully operational mode began on June 16, 2006.

## Appendix

### 1) Monthly Performance Data

#### UNIT 482

Month	Total Time in Month	Total Run Time During Month	Total Run Time During Scheduled Test Periods (Note 1)			Scheduled Starts	Attempted Starts	Actual Starts	Availability (Note 2)	Reliability (Note 3)	Net Energy Produced
	(Hours)	(Hours)	(Hours) Scheduled	(Hours) Actual	(Hours) Cumulative				(%)	(%)	(kWe-hr)
Jun-06	420	11.6	11.6	11.6	11.6	43	43	43	100.0%	100.0%	13.9
Jul-06	744	22.2	22.2	22.2	33.8	73	73	73	100.0%	100.0%	26.6
Aug-06	744	5.2	19.5	5.2	39.0	77	21	20	26.7%	95.2%	6.2
Sep-06	720	14.2	19.2	14.2	53.2	82	73	72	74.0%	98.6%	17.0
Oct-06	744	21.3	20.2	20.2	73.4	83	84	83	100.0%	98.8%	24.2
Nov-06	720	20.0	19.2	19.2	92.6	82	82	82	100.0%	100.0%	23.0
Dec-06	744	21.3	20.2	20.2	112.8	83	88	83	100.0%	94.3%	24.2
Jan-07	744	21.0	19.8	19.8	132.6	85	83	82	100.0%	98.8%	23.8
Feb-07	672	19.0	18.0	18.0	150.6	76	80	78	100.0%	97.5%	21.6
Mar-07					150.6				#DIV/0!	#DIV/0!	
Apr-07					150.6				#DIV/0!	#DIV/0!	
May-07					150.6				#DIV/0!	#DIV/0!	
					150.6				#DIV/0!	#DIV/0!	
					150.6				#DIV/0!	#DIV/0!	

Running Totals	Total Time in Month	Total Run Time During Month	Total Run Time During Scheduled Test Periods				Total Attempted Starts	Total Actual Starts	Total Availability (Note 8)	Total Reliability	Total Energy Produced
	(Hours)	(Hours)	(Hours) Scheduled	(Hours) Actual	(Hours) Cumulative				(%)	(%)	(kWe-hr)
	6252	155.9	169.9	150.6	150.6				684.0	627.0	616.0

**UNIT 483**

Month	Total Time in Month	Total Run Time During Month	Total Run Time During Scheduled Test Periods (Note 1)			Scheduled Starts	Attempted Starts	Actual Starts	Availability (Note 2)	Reliability (Note 3)	Net Energy Produced
	(Hours)	(Hours)	(Hours) Scheduled	(Hours) Actual	(Hours) Cumulative				(%)	(%)	(kWe-hr)
Jun-06	420	11.6	11.6	11.6	11.6	43.0	43	43	100%	100%	19.7
Jul-06	744	22.2	22.2	22.2	33.8	73.0	73	73	100%	100%	37.7
Aug-06	744	1.5	19.5	1.5	35.3	77.0	12	9	8%	75%	2.6
Sep-06	720	14.2	19.2	14.2	49.5	82.0	66	65	74%	98.5%	24.1
Oct-06	744	20.2	20.2	20.2	69.7	83.0	78	77	100%	98.7%	34.3
Nov-06	720	16.9	19.2	16.9	86.6	82.0	71	70	88%	98.6%	28.7
Dec-06	744	21.3	20.2	20.2	106.8	83.0	82	81	100%	98.8%	34.3
Jan-07	744	39.6	19.8	19.8	126.6	85.0	110	100	100%	90.9%	33.7
Feb-07	672	19.0	18.0	18.0	144.6	76.0	74	73	100.0%	98.6%	30.6
Mar-07					144.6				#DIV/0!	#DIV/0!	0.0
Apr-07					144.6				#DIV/0!	#DIV/0!	0.0
May-07					144.6				#DIV/0!	#DIV/0!	0.0
					144.6				#DIV/0!	#DIV/0!	0.0
					144.6				#DIV/0!	#DIV/0!	0.0

Running Totals	Total Time in Month	Total Run Time During Month	Total Run Time During Scheduled Test Periods				Total Attempted Starts	Total Actual Starts	Total Availability (Note 8)	Total Reliability	Total Energy Produced
	(Hours)	(Hours)	(Hours) Scheduled	(Hours) Actual	(Hours) Cumulative				(%)	(%)	(kWe-hr)
	6252	166.5	169.9	144.6	144.6	684.0	609.0	591.0	85.1%	97.0	245.7

2) Maintenance/Incident Log

Incident Report/Work Log			Ft Hood
Report Date:	8/30/06	Technician Initials:	WH FC Serial #: 482
Event:	E-STOP		
Total Hours On-Site:	4		
Mileage:	150		
Type of Outage:	<input type="checkbox"/> Scheduled <input checked="" type="checkbox"/> Unscheduled		
Failure Date/Time:	8/7/06 0:00		
Restart Date/Time:	N/A		
Total Hours Unavailable:	N/A		
<div style="float: right; border: 1px dashed black; padding: 5px; margin-top: 10px;"> <b>Meter Readings:</b>                      Gas: N/A                      Electric: N/A                      BTU: N/A                      FC Operating Hours: 42                 </div>			
Problem Description: <b>FOUND MAJORITY OF COOLANT LEAKED OUT OF SYSTEM. ADDED DISTILLED WATER FOR TROUBLESHOOTING. FOUND COOLANT</b> NOTE: UNIT 483 ALSO HAS LEAKING STACK AT 42 HOURS RUN-TIME.			
Service Performed or Corrective Action Taken: <u>ORDERED PARTS FOR STACK REPLACEMENT NEXT WEEK.</u>			
Report Date:	9/5/06	Technician Initials:	WH FC Serial #: 482
Event:	STACK REPLACEMENT		
Total Hours On-Site:	6		
Mileage:	150		
Type of Outage:	<input type="checkbox"/> Scheduled <input checked="" type="checkbox"/> Unscheduled		
Failure Date/Time:	8/7/06 13:00		
Restart Date/Time:	9/6/06 13:00		
Total Hours Unavailable:	720		
<div style="float: right; border: 1px dashed black; padding: 5px; margin-top: 10px;"> <b>Meter Readings:</b>                      Gas: N/A                      Electric: N/A                      BTU: N/A                      FC Operating Hours: 42                 </div>			
Problem Description: <b>FOUND MAJORITY OF COOLANT LEAKED OUT OF SYSTEM THROUGH FUEL CELL STACK PLATES, INSIDE AND OUTSIDE.</b>			
Service Performed or Corrective Action Taken: <u>REPLACED FUEL CELL STACK; REPLACED HYDROGEN SENSOR</u>			
Report Date:	8/31/06	Technician Initials:	WH FC Serial #: 482
Event:	CONNECTED MINOR, MAJOR, LOW FUEL ALARMS AT FUEL CELL. ALSO CHECKED ON HYDROGEN STORAGE MODULE FUEL LEAK		
Total Hours On-Site:	2		
Mileage:	150		
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled		
Failure Date/Time:	N/A		
Restart Date/Time:	N/A		
Total Hours Unavailable:	N/A		
<div style="float: right; border: 1px dashed black; padding: 5px; margin-top: 10px;"> <b>Meter Readings:</b>                      Gas: N/A                      Electric: N/A                      BTU: N/A                      FC Operating Hours: 42                 </div>			
Problem Description: #####			
Service Performed or Corrective Action Taken: <u>CONNECTED WIRING, CONTACTED PLUG POWERABOUT LEAK.</u>			

Report Date:	8/30/06	Technician Initials:	WH	FC Serial #:	483
Event:	E-STOP				
Total Hours On-Site:	4				
Mileage:	150				
Type of Outage:	<input type="checkbox"/> Scheduled <input checked="" type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>            Gas: N/A            Electric: N/A            BTU: N/A            FC Operating Hours: 42         </div>			
Failure Date/Time:	8/3/06 12:00				
Restart Date/Time:	N/A				
Total Hours Unavailable:	N/A				
<b>Problem Description:</b> FOUND MAJORITY OF COOLANT LEAKED OUT OF SYSTEM. ADDED DISTILLED WATER TO TROUBLESHOOT SYSTEM. COOLANT LEAKING. NOTE: UNIT 482 ALSO HAS LEAKING STACK AT 42 HOURS RUN TIME.					
<b>Service Performed or Corrective Action Taken:</b> ORDERED PARTS FOR STACK REPLACEMENT NEXT WEEK.					

Report Date:	9/5/06	Technician Initials:	WH	FC Serial #:	483
Event:	STACK REPLACEMENT				
Total Hours On-Site:	6				
Mileage:					
Type of Outage:	<input type="checkbox"/> Scheduled <input checked="" type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>            Gas: N/A            Electric: N/A            BTU: N/A            FC Operating Hours: 42         </div>			
Failure Date/Time:	8/3/06 13:00				
Restart Date/Time:	9/6/06 13:00				
Total Hours Unavailable:	816				
<b>Problem Description:</b> FOUND MAJORITY OF SYSTEM COOLANT LEAKED OUT THROUGH FUEL CELL STACK PLATES, INSIDE AND OUTSIDE.					
<b>Service Performed or Corrective Action Taken:</b> REPLACED FUEL CELL STACK; REPLACED HYDROGEN SENSOR					



Report Date:	8/31/06	Technician Initials:	WH	FC Serial #:	483
Event:	CONNECT MINOR, MAJOR, LOW FUEL ALARMS FOR CUSTOMER				
Total Hours On-Site:	150				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>  Gas _____  Electric _____  BTU _____  FC Operating Hours _____ </div>			
Failure Date/Time:	N/A				
Restart Date/Time:	N/A				
Total Hours Unavailable:	N/A				
Problem Description:	USING MINOR ALARM FOR CUSTOMER REQUESTED GENERATOR RUN INDICATION. ALSO CONNECTED LOW FUEL AND MAJOR AI				
Service Performed or Corrective Action Taken:	CONNECTED ALARM WIRING AT FUEL CELL.				
Report Date:	9/6/06	Technician Initials:	WH	FC Serial #:	482 & 483
Event:	FINAL TESTING OF SYSTEMS AFTER STACK REPLACEMENTS. CUSTOMER REQUESTED ALARM WIRING EXTENDED INTO RSC4				
Total Hours On-Site:	9				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>  Gas _____ N/A  Electric _____ N/A  BTU _____ N/A  FC Operating Hours <input checked="" type="checkbox"/> 42 </div>			
Failure Date/Time:	N/A				
Restart Date/Time:	N/A				
Total Hours Unavailable:	N/A				
Problem Description:	FINAL SYSTEM TESTS, CUSTOMER REQUESTED ALARM WIRING ADDED.				
Service Performed or Corrective Action Taken:	FINAL SYSTEM CHECKOUT. EXTENDED ALARM WIRING INTO RSC4 COMMUNICATIONS				
Report Date:	9/28/06	Technician Initials:	WH	FC Serial #:	482 & 483
Event:	SOFTWARE UPGRADE TO 1.9 (NEW GENCORE SERVICE INTERFACE SOFTWARE)				
Total Hours On-Site:	4				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>  Gas _____ N/A  Electric _____ N/A  BTU _____ N/A  FC Operating Hours <input checked="" type="checkbox"/> 55 </div>			
Failure Date/Time:	N/A				
Restart Date/Time:	N/A				
Total Hours Unavailable:	N/A				
Problem Description:	INSTALLED NEW 1.9 SOFTWARE (NEW GENCORE SERVICE INTERFACE SOFTWARE)				
Service Performed or Corrective Action Taken:	INSTALLED NEW 1.9 SOFTWARE (NEW GENCORE SERVICE INTERFACE SOFTWARE)				

Report Date:	11/30/06	Technician Initials:	WH	FC Serial #:	483
Event:	SITE CHECKOUT (IN AREA)				
Total Hours On-Site:	2.5				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>            Gas: N/A            Electric: N/A            BTU: N/A            FC Operating Hours: 93 SYS; 52 STK         </div>			
Failure Date/Time:	11/30/06 8:30				
Restart Date/Time:	11/30/06 11:00				
Total Hours Unavailable:	2				
<b>Problem Description:</b> HADA GAS SENSOR SHUT DOWN ON 483 OVER THANKSGIVING HOLIDAY SO DECIDED TO CHANGE OUT SENSORS ON BOTH UNITS WHILE IN THE AREA					
<b>Service Performed or Corrective Action Taken:</b> PROACTIVELY REPLACED HYDROGEN SENSOR; INSTALLED NEW GCC 1.9.1 SOFTWARE; RAN SYSTEMS AND CHECKED CONNECTIVITY BY CALLING UNITS FROM LOCAL PHONE LINE AT CONTROL CONSOLE.					
Report Date:	1/16/07	Technician Initials:	WH	FC Serial #:	482
Event:	PLUG TSB GC068: ADDITION OF FILTER CAPACITOR BOARD & NEW NGK HYDROGEN SENSOR				
Total Hours On-Site:	6				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled	<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>            Gas:                                  Electric:                           BTU:                                 FC Operating Hours: 150 SYS; 109 STK         </div>			
Failure Date/Time:	2/16/07 8:30				
Restart Date/Time:	2/16/07 8:30				
Total Hours Unavailable:	0				
<b>Problem Description:</b> PLUG TSB GC068: ADDITION OF FILTER CAPACITOR BOARD & NEW NGK HYDROGEN SENSOR AND INSTALL NEW SERVICE INTERFACE SOFTWARE. NEW HYDROGEN SENSOR IS SUPPOSED TO LAST LONGER THAN OLD STYLE AND IS ABLE TO BE MANUALLY RESET.					
<b>Service Performed or Corrective Action Taken:</b> INSTALLED NEW POWER FILTER CAPACITOR BOARD AND NGK HYDROGEN SENSOR RETROFIT KIT. INSTALLED LATEST SERVICE INTERFACE SOFTWARE VERSION 1.9.2. TESTED FUEL CELL OPERATION AND WITNESSED TIMED LOW BUS START AFTER RETROFIT.					

Report Date:	1/16/07	Technician Initials:	WH	FC Serial #:	483
Event:	PLUG TSB GC068: ADDITION OF FILTER CAPACITOR BOARD & NEW NGK HYDROGEN SENSOR				
Total Hours On-Site:	6				
Mileage:	150				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled		<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>          Gas _____          Electric _____          BTU _____          FC Operating Hours 166 SYS; 125 STK       </div>		
Failure Date/Time:	2/16/07 8:30				
Restart Date/Time:	2/16/07 8:30				
Total Hours Unavailable:	0				
Problem Description: PLUG TSB GC068: ADDITION OF FILTER CAPACITOR BOARD & NEW NGK HYDROGEN SENSOR AND INSTALL NEW SERVICE INTERFACE SOFTWARE. NEW HYDROGEN SENSOR IS SUPPOSED TO LAST LONGER THAN OLD STYLE AND IS ABLE TO BE MANUALLY RESET.					
Service Performed or Corrective Action Taken: INSTALLED NEW POWER FILTER CAPACITOR BOARD AND NGK HYDROGEN SENSOR RETROFIT KIT. INSTALLED LATEST SERVICE INTERFACE SOFTWARE VERSION 1.9.2. TESTED FUEL CELL OPERATION AND WITNESSED TIMED LOW BUS START AFTER RETROFIT. ALSO HAD PROBLEM WITH CALLING MODEM, APPEARS TO HAVE A CONNECTION PROBLEM TO GCC, FINALLY ABLE TO MAKE WORK.					

Report Date:	3/1/07	Technician Initials:	WH	FC Serial #:	482
Event:	ADDITION OF INFORMATION (BELOW) RE:email to Plug Power (3/31/07) about ICESM #IC04B000000086 LEAK				
Total Hours On-Site:	N/A				
Mileage:	N/A				
Type of Outage:	<input checked="" type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled		<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>          Gas _____          Electric _____          BTU _____          FC Operating Hours _____       </div>		
Failure Date/Time:					
Restart Date/Time:					
Total Hours Unavailable:	0				
Problem Description: The ICESM (Ser #IC04B000000086) for Fort Hood Gencore 482 has always had a small leak on high pressure manifold A (Bank 2 on the SI). It is leaking out of the NOTE: CLICK ON ABOVE LINE TO READ FULL PROBLEM DESCRIPTION.					
Service Performed or Corrective Action Taken: THIS PROBLEM DESCRIPTION IS A SUPPLEMENT TO REPORT DATE 8/31/06 (482) PROBLEM DESCRIPTION					

Report Date:		Technician Initials:		FC Serial #:	
Event:					
Total Hours On-Site:					
Mileage:					
Type of Outage:	<input type="checkbox"/> Scheduled <input type="checkbox"/> Unscheduled		<div style="border: 1px dashed black; padding: 5px;"> <b>Meter Readings:</b>          Gas _____          Electric _____          BTU _____          FC Operating Hours _____       </div>		
Failure Date/Time:					
Restart Date/Time:					
Total Hours Unavailable:	0				
Problem Description:					
Service Performed or Corrective Action Taken:					